

CLAIM AMENDMENT

Please amend the claims in accordance with the following listing.

Listing of Claims:

1. (Original): A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including recording changes to said zombie filesystem in a persistent memory.

2. (Original): A method as in claim 1, including, for a deletion operation on a file in said live filesystem,

transferring said file from said live filesystem to said zombie filesystem;

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem, wherein said recording of changes includes recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect said deletion operation.

3. (Original): A method as in claim 1, including, for a truncation operation on a file in said live filesystem,

transferring at least a portion of said file from said live filesystem to said zombie filesystem;

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, wherein said recording of changes includes recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links.

4. (Original): A method as in claim 1, including, for an operation apparent to users as substantially atomic, performing said operation in a plurality of steps using said zombie filesystem, wherein said recording changes is performed in said persistent memory for each of said plurality of steps.

5. (Original): A method as in claim 1, including, for an operation performed on a file having attached data elements, performing said operation using said zombie file-space.

6. (Original): A method as in claim 1, including, for an operation performed using said zombie filesystem, altering a size of said zombie filesystem during performance of said operation.

7. (Original): A method as in claim 1, including, for an operation performed using said zombie filesystem, checkpointing said filesystem during performance of said operation.

8. (Original): A method as in claim 1, including recording changes to said live filesystem in said persistent memory, wherein records of changes to said live filesystem and of changes to said zombie filesystem are substantially interspersed.

9. (Original): A method as in claim 1, including replaying a set of said changes in response to said record.

10. (Original): A method as in claim 1, including replaying a set of said changes to said live filesystem and to said zombie filesystem, wherein replay of changes includes substantial interspersed performance of changes to said live filesystem and to said zombie filesystem.

11. (Original): A method as in claim 1, including replaying a set of said changes in said record in response to a crash recovery by said filesystem.

12. (Original): A method as in claim 1, wherein said persistent memory includes a log of substantially all changes, within a selected time duration, to either said live filesystem or said zombie filesystem.

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13. (Original): A method as in claim 1, wherein said persistent memory includes a log of substantially all changes, within a selected time duration, to said zombie filesystem.

14. (Original): A method as in claim 1, wherein said recorded changes include a set of substantially atomic operations to said zombie filesystem.

15. (Original): A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including dynamically growing said zombie filesystem.

16. (Original): A method as in claim 15, including, for a deletion or truncation operation on a file in said live filesystem,

allocating storage within said zombie filesystem for metadata associated with said file;
performing said dynamic growth in response to failure of said allocation of storage;
re-performing said allocation of storage after said dynamic growth; and
transferring said file from said live filesystem to said zombie filesystem.

17. (Original): A method as in claim 15, wherein said dynamic growth occurs, for an operation performed using said zombie filesystem, during performance of said operation.

18. (Original): A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file to said zombie filesystem before breakage of links to blocks in said file, in response to an operation on said file, said operation using said zombie filesystem.

19. (Currently Amended): A method as in claim 18, wherein, for a deletion operation on a file in said live filesystem,

said transfer includes

creating a link associating said file with said zombie filesystem; and

breaking a link associating said file with said live filesystem;

and said deletion operation includes

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem, ~~wherein said recording of changes includes~~ filesystem;

recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect said deletion operation.

20. (Original): A method as in claim 18, wherein, for a truncation operation on a file in said live filesystem,

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said transfer includes

creating a link associating at least a portion of said file with said zombie filesystem; and

breaking a link associating said portion with said file in said live filesystem;

and said truncation operation includes

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, wherein said recording of changes includes recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links.

21. (Original): A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

transfer of a file to said zombie filesystem before performing any substantial portion of an operation on said file, said operation using said zombie filesystem.

22. (Currently Amended): A method as in claim 21, wherein, for a deletion operation on a file in said live filesystem,

said transfer includes

creating a link associating said file with said zombie filesystem; and

breaking a link associating said file with said live filesystem;

and said deletion operation includes

breaking links associating disk blocks with said file in a plurality of steps only while said file is associated with said zombie filesystem, ~~wherein said recording of changes includes~~ filesystem;

recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect said deletion operation.

23. (Currently Amended): A method as in claim 21, wherein, for a truncation operation on a file in said live filesystem,

said transfer includes

creating a link associating at least a portion of said file with said zombie filesystem; and

breaking a link associating said portion with said file in said live filesystem;

and said truncation operation includes

breaking links associating disk blocks with said file in a plurality of steps only while a portion of said file is associated with said zombie ~~filesystem~~, ~~wherein said recording of changes includes~~ filesystem;

recording said breaking of links in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links.

24. (Original): A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

replay of an operation on a file, said operation using said zombie filesystem.

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25. (Original): A method as in claim 24, wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a deletion operation on a file in said live filesystem,

transferring said file from said live filesystem to said zombie filesystem, and recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect said deletion operation, and recording said alteration in said persistent memory.

26. (Original): A method as in claim 24, wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a truncation operation on a file in said live filesystem,
transferring at least a portion of said file from said live filesystem to said zombie filesystem,
and recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links, and recording said alteration in said persistent memory.

27. (Original): A method of operating a filesystem, said filesystem including a live filesystem accessible to users and a zombie filesystem not accessible to users, said method including

replay of a set of filesystem operations, said operations including at least some operations using said live filesystem and at least some operations using said zombie filesystem.

28. (Original): A method as in claim 27, wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a deletion operation on a file in said live filesystem,

transferring said file from said live filesystem to said zombie filesystem, and recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect said deletion operation, and recording said alteration in said persistent memory.

29. (Original): A method as in claim 27, wherein said replay is responsive to a set of recorded changes in a persistent memory;

and including, for a truncation operation on a file in said live filesystem,

transferring at least a portion of said file from said live filesystem to said zombie filesystem, and recording said transfer in said persistent memory;

breaking links associating disk blocks with said file in a plurality of steps while a portion of said file is associated with said zombie filesystem, and recording said breaking of links in said persistent memory in a plurality of steps; and

altering said live filesystem to reflect changes associated with said breaking of links, and recording said alteration in said persistent memory.